

WHAT IS CLAIMED IS:

1. A method for removing a contaminant from a fluid stream, comprising contacting the fluid stream with a composite of activated carbon and a magnetic material whereby the contaminant is adsorbed on the magnetized activated carbon, and removing the magnetized activated carbon having the mercury adsorbed thereon from the fluid stream.
2. The method according to Claim 1, wherein the contaminant is mercury.
3. The method according to Claim 1, wherein the composite further comprises a photocatalyst and further comprising the steps of exposing the photocatalyst to excitation energy to provide hydroxyl radicals on the surface thereof.
4. The method according to Claim 3, wherein the photocatalyst is  $\text{TiO}_2$ .
5. The method according to Claim 3, wherein the photocatalyst is present in the composite in an amount of less than about 10% by weight based upon the total weight of the photocatalyst and composite of activated carbon and magnetic material.
6. The method according to Claim 5, wherein the photocatalyst is present in the composite in an amount of less than about 7% by weight based upon the total weight of the photocatalyst and composite of activated carbon and magnetic material.
7. The method according to Claim 6, wherein the photocatalyst is present in the composite in an amount of less than about 5% by weight based upon the total weight of the photocatalyst and composite of activated carbon and magnetic material.
8. The method according to Claim 1, further comprising the step of recycling the magnetized activated carbon removed from the fluid stream back into contact with the fluid stream.

9. The method according to Claim 1, wherein the fluid stream is flue gas from a combustion plant.
10. The method according to Claim 9, wherein the combustion plant is a coal combustion plant or a waste combustion plant.
11. The method according to Claim 1, wherein the activated carbon is injected into the fluid stream under pressure.
12. The method of Claim 1, wherein the activated carbon is powdered activated carbon.
13. The method of Claim 1, wherein the magnetic material is selected from the group consisting of magnetite, maghemite, hematite and goethite.
14. The method according to Claim 1, wherein the composite contains activated carbon and magnetic material in a weight ratio of less than about 5:1.
15. The method according to Claim 14, wherein the composite contains activated carbon and magnetic material in a weight ratio of less than about 4:1.
16. The method according to Claim 14, wherein the composite contains carbon and magnetic material in a weight ratio of less than about 3:1.
17. A composite, comprising activated carbon and a magnetic material.
18. The composite according to Claim 17, wherein the activated carbon is powdered activated carbon.
19. The composite according to Claim 17, wherein the magnetic material is selected from the group consisting of magnetite, maghemite, hematite and goethite.
20. The composite according to Claim 17, further comprising a photocatalyst.

21. The composite according to Claim 20, wherein the photocatalyst is selected from the group consisting of  $\text{TiO}_2$ ,  $\text{ZnO}$  and  $\text{SnO}_2$ .

22. The composite according to Claim 21, wherein the photocatalyst is  $\text{TiO}_2$ .

23. The composite according to Claim 20, wherein the photocatalyst is present in an amount of less than about 10% by weight based upon the total weight of the photocatalyst and composite of activated carbon and magnetic material.

24. The composite according to Claim 23, wherein the photocatalyst is present in an amount less than about 7% by weight based upon the total weight of the photocatalyst and composite of activated carbon and magnetic material.

25. The composite according to Claim 24, wherein the photocatalyst is present in an amount of less than about 5% by weight based upon the total weight of the photocatalyst and composite of activated carbon and magnetic material.

26. The composite according to Claim 17, wherein the composite contains activated carbon and magnetic material in a weight ratio of less than about 5:1.

27. The composite according to Claim 26, wherein the composite contains activated carbon and magnetic material in a weight ratio of less than about 4:1.

28. The composite according to Claim 26, wherein the composite contains activated carbon and magnetic material in a weight ratio of less than about 3:1.